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Effective Google Search For Middle School Students: A Self-Instructional Web-Based Module To Teach Internet Searching Skills

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Abstract: Searching on the Internet is a common daily task for most students. Students often spend time searching for personal information or doing research for class assignments with little guidance on how to effectively search on the Internet. Younger middle school students frequently search by means of trial and error. They seldom reflect on why certain search queries yield a positive result while others do not. This can lead to wasted time and frustration (Henry, 2005). The objective of this web-based instructional module is to provide an interactive Internet search tutorial with practice problems and immediate feedback to teach students how to improve their Internet search skills. Results from the pretest, posttest, qualitative comments, and learning module evaluation survey indicate that the instructional module helped students improve their Internet search skills, and the interactive components were effective in promoting student engagement. Students appreciated learning about how Google search works.

Introduction

Computer is an important part of our daily lives. We use the computer for work, entertainment, and study. It is an integral part of our culture. Being able to find and use information effectively is becoming an essential skill for students of all ages (Berkowitz & Serim, 2002). Middle and high school students are now required to learn how to gather and synthesize information through using a variety of technological and information resources (National Council of Teachers of English, 2012). As schools integrate more and more technology into the classroom "new literacy," skills such as identifying, locating, evaluating, synthesizing, and communicating information are essential in helping students prepare for the digital society. Of these five skills the ability to locate information is the most critical. Much of what we do on the Internet is based on our ability to effectively search for information (Henry, 2005). Numerous search engines such as Bing, Yahoo! Search, Ask.com, Ixquick Metasearch, ZapMeta, and Infomine are

available for users (Berger, 2012), but the Google search engine is the most popular. It is used by 70% of the world's Internet searches (Springboard SEO, 2011). The purpose of this instructional design project is to develop a self-instructional web-based module to teach Internet searching skills specifically to middle school students.

Background

Internet searching is a common activity in our daily life. Approximately 500 million searches are performed on major search engines every day, and Google is used by 70% of the world's Internet searches (Springboard SEO, 2011). Search engines are useful tools and several tutorial articles, videos, posters, and websites are available to help users learn how to search on the Internet. Current Internet search tutorial websites such as www.googleguide.com and www.powersearchingwithgoogle.com provide important information, but the design of these sites is usually text heavy with few graphics or interactive features. Younger students prefer websites that are colorful, interactive, with minimal text, relevant graphics, quick feedback, and opportunity for social interaction (Chow, Smith, & Sun, 2012). An instructional website that contains these features will have greater success in attracting, engaging, and teaching younger middle school students.

Why is there a need to focus on teaching middle school students Internet searching skills? Students need to learn how to use technology to do research, to communicate, and to collaborate. They also need to learn how to evaluate information on the Internet and to manipulate interaction on web pages. These "new literacy skills" are as important as the traditional reading, writing, and arithmetic skills (Coiro, 2003). Effective Internet search skills embody these new literacy skills. Additionally, middle school students are prime targets for information literacy skill training because they have reached a developmental stage where they can better comprehend the reliability of information (Henry, 2005).

Methods

The purpose of this instructional design project is to develop a self-instructional interactive web-based module to teach middle school students Internet search skills. The instructional module will focus primarily on the Google search engine and how Google compiles search queries. Participants will also learn how to effectively interpret the search result page. Because keyword selection is a "lynchpin" to successful Internet search (Eagleton, Guinee, & Langlais, 2003), great emphasis will be placed on the use of critical keywords and proper placement of those keywords to construct effective search queries.

Instructional Strategies

The instructional module is design to be completed in one hour. There are detailed instructions to guide the students throughout the learning process. Immediate feedbacks are incorporated in each stage of the learning module to promote student interest and comprehension. The learning module also provides students with videos, interactive quizzes, and vocabulary game to accommodate various learning styles. Because this is a web-based module, students are able to proceed at their own pace.

Components of the Dick, Carey & Carey (2011) instructional model were used to develop the web-based learning module. The module comprised of ShoutBox (comment) widgets, pretest, interactive vocabulary game, video tutorials, embedded quizzes, posttest, and a module evaluation survey. Participants proceeded through the module at their own pace and were encouraged to repeat the lessons and embedded quizzes as needed to learn the concepts. The participants were also encouraged to type in short narratives of their learning experience in the embedded ShoutBox widget as they progress through the instructional module. After completing the learning module, participants completed a five-point Likert scale evaluation form to provide feedback on the effectiveness of the learning module. Pretest and posttest were also implemented to evaluate students' comprehension of the learning objectives.

The web-based learning module contains four interactive lessons. In the first lesson students played the drag and drop vocabulary game with answer key and background music to learn basic Internet vocabulary words. In the second lesson student viewed a short video developed by Google about how Google search works. After viewing the video students then take a multiple-choice quiz about how Google search works. Each quiz question included a "Check Answer" button to provide students with immediate feedback. In the third lesson the students viewed an animation skit about how to choose proper search keywords. Students were then given the opportunity to practice this skill by choosing appropriate keywords to create good search statements for various questions. Students typed their search statements in an embedded text area and compared their answers by clicking on the "Compare Answer" button. In the last lesson students viewed a video about how to scan the search result pages and were asked to summarize the tips given in the video. Students typed their summary in an embedded text area, and a "Compare Answer" button was provided for immediate feedback.

Population

The target audience for the instructional module is middle school students at a private all-girls school. The age of the students range from 11 to 14 years old. The majority of the students are from middle to upper class families. All students have a school assigned

iPad and Internet connection at home. Students can also access desktop computers from the school's Computer Lab and from the Tech Center. Students and parents signed the consent to participate forms before students may participate in the study.

Data Collection

Three phases of the formative evaluation were implemented to determine the effectiveness of the learning module and to identify areas for improvement (Dick, Carey, & Carey, 2011). In the first Expert Review evaluation stage, three University of Hawaii graduate students reviewed the instructional module and provided detailed feedback on ways to improve. The module was modified before implementing the second evaluation stage. In the second One-to-One evaluation stage, two middle school students from public schools volunteered with their parents' permission to evaluate the learning module from their home computers and gave feedback about their learning experience with the instructional module. The module was modified again before implementing the last Small Group evaluation stage.

In the Small Group evaluation stage, thirteen middle school students from an all girls private school volunteered to participate in this study. The students completed the learning module in one 80-minute period during a Middle School Technology class. Students were instructed to use pseudonym throughout the module to ensure anonymity. Three of the thirteen students did not complete all components of the learning module; therefore, their data were excluded from the analysis of this learning module. However, all comments from the ShoutBox widget were analyzed for effectiveness of learning objectives regardless of module completion status. Data from the online pretest, posttest, module evaluation survey, and ShoutBox comments were analyzed to identify strengths and weaknesses of the instructional module.

Results

Eight of the ten students scored higher on the posttest than the pretest. One student showed a significant increase of 70% in the test score after completing the learning module. Two of the ten students scored the same on the pretest as in the posttest.

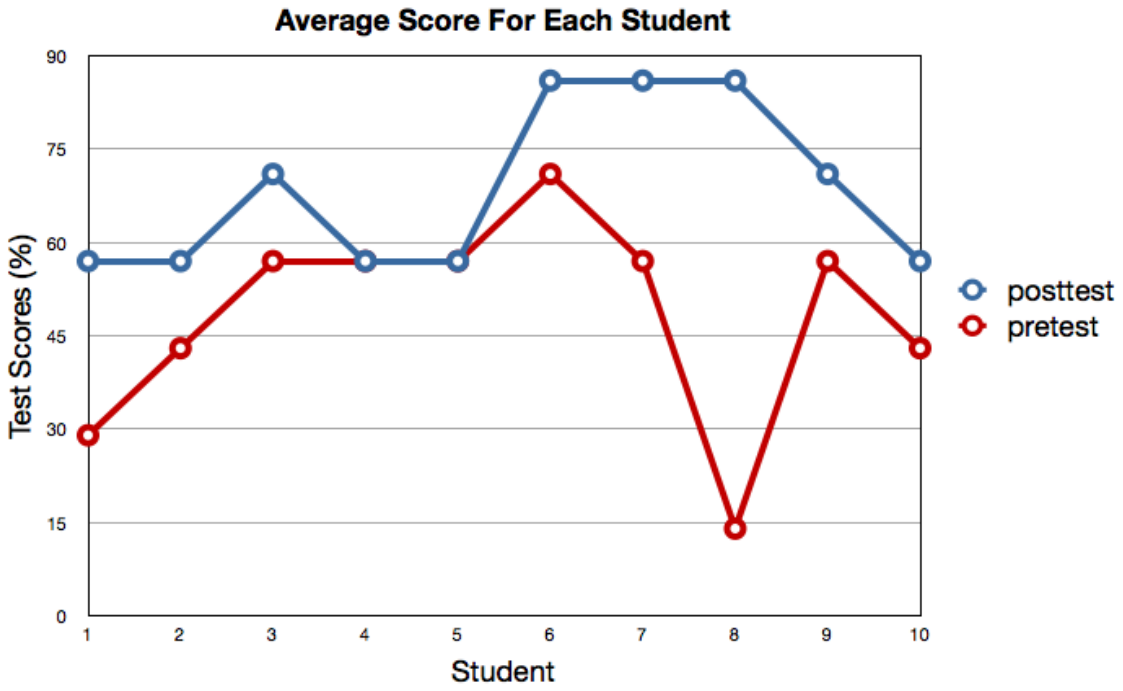

Figure 1. Average pretest and posttest score for each student.

In the pretest, none of the students were able to determine how Google ranked web pages:

1. Google determines the ranking of the web page by looking at _____.

A. how many followers the web page has
B. the design of the web page
C. how often people visit that web page
D. how many times other web pages link to that page

Table 1 summarizes the results of the evaluation survey. The evaluation survey indicates that participants were engaged in the activities of the learning module, learning objectives were clear, and most agreed that the learning module did help them to improve their Internet search skills. The survey also indicates that there is a need for more practice and feedback on the exercises. Most importantly, the students indicated that the instructions were confusing at times.

Table 1. Percentage of participants who agreed or strongly agreed on evaluation items (n=10)

Items	Percentage (%)
I was engaged (on task) throughout this online tutorial.	90%
I understood what I was supposed to learn.	80%
This online tutorial helped me to improve my Internet search	80%

skills using Google search engine.	
There were sufficient (enough) practice exercises included.	70%
I received sufficient (enough) feedback on all the exercises.	70%
The quizzes and tests correctly measured my knowledge of the learning objectives.	70%
It was easy to navigate through this web-based online tutorial.	70%
The instructions were clear and easy to understand.	50%

Table 2 summarizes the ShoutBox comments from the participants. Participants were very satisfied with the Vocabulary and How Search Works lessons but were confused with the Pretest and the Keywords lesson. Participants had mixed feelings about the Search Results lesson, and some encountered problems with loading the video in this lesson.

Table 2. Comments from participants.

Learning Module Components	Comments (from the embedded ShoutBox Widget)
Pretest	● I was a bit confused ● I did not understand what to do on this page ● One suggestion though would be because most of us don't know the stuff on the pretest, it would be nice to see our results with some explanations at the end ● Most of the questions were confusing. I don't understand some of the wording or terms. ● The pretest was a bit confusing because I didn't quite understand everything
Vocabulary	● I understood everything though and the vocab game was fun ● I liked the vocab game ● I like the game, maybe when you refresh the questions should be in a different order, but I really like it. ● the vocab game was pretty entertaining.
How Search Works	● the how search works video was really helpful ● That was a really cool video (how search works) ● I really liked the video and the quiz (how search works) ● I like how there was a video. It help a lot with my understanding.

	• I thought that this page was really good. I understand where to go and the video was very clear on how google works. • How Search Works - I like the video, and the quiz was pretty good. • I love the first video! Its cute! and it helped a little.
Keywords	• it was hard trying to figure out how to decide the importance of the keywords, maybe some tips would help • I am on the keywords section. Everything was very clear, but the video wasn't too great. • I had trouble understanding the questions you were asking in the keywords section • i thought the keywords page was kinda boring • I did not understand what to do on this page
Search Results	• i really liked the videos for every section except for the search results. • i really liked the video but it took a long time to load • That was the easiest of all • i enjoyed the search result video and the music was fabu • I liked this page, it made sense, and the video was good even though it was short • Ive been refreshing and waiting 4 like 10 minutes and the video isnt playing

Discussion

Results from the data indicate that participants found the instructional module to be helpful in teaching Internet search skills (see Table 1). The Vocabulary game and Videos helped the students to be more engaged, and the learning objectives were clear (see Table 2). Data from the pretest and posttest also indicate that students gained more knowledge about Internet search skills after completing the learning module (see Figure 1). Eight of the ten students scored higher on the posttest than the pretest, and one student scored significantly higher after completing the learning module (70% increase). Critical components of creating good Google search queries are the understanding how Google search works and the understanding of how web pages are ranked by Google according to the keywords used. None of the participants was able to determine Google's web page ranking scheme in the pretest. This strongly suggests an area of weakness that needs to be addressed to help students improve their Internet search skills.

Data from the evaluation form and from the ShoutBox comments strongly suggest that instructions in the pretest need to be modified to provide more clarity as to the objective of a pretest. One student suggested providing immediate feedback on the pretest with

explanation. Her suggestion is thoughtful and relevant, but it also indicates her misunderstanding of the pretest purpose. To address this concern, a stronger emphasis needs to placed in the pretest instructions to clearly inform the students that it is okay if they do not understand the pretest questions; and that after going through the learning module, they will be able to better answer these questions in the posttest.

Another important area for improvement is the Keywords lesson. Comments from the ShoutBox widget indicate that students had difficulty understanding how to determine proper keywords for their search queries (see Table 2). Using keywords to formulate good search queries require student to synthesize information learned from the previous lessons. Students need to apply the information they learned about how Google rank and display web pages in order to select appropriate keywords. To help students achieve this higher order thinking skill, the instructional module needs to incorporate learning activities that model the keywords selection process. More practice examples, quizzes, immediate relevant feedbacks, and videos are also needed to improve the Keywords lesson.

Overall the data indicates that students gained a better understanding of how to search on the Internet using the Google search engine, and that the interactive components of the learning module were effective in keeping the students engaged. The data also indicates the needs to improve the pretest instructions and most importantly the improvement of the Keywords lesson.

Conclusion

In conclusion, effective Internet search is a critical skill to have in education and in everyday life. The Internet is now the main source of information for students to do research, to learn, and to explore the world. A well-designed instructional interactive web-based module that provides effective Internet search information, interactive guidance and feedbacks, and addresses the learning styles and needs of middle school students is a valuable tool. This instructional design study supports the importance of developing such a tool.

References

Berger, P. (2012). Searching Google and beyond: Tips, strategies and resources. Retrieved February, 15, 2012, from http://infosearcher.typepad.com/infosearcher/resources/googlebeyond.html
http://infosearcher.typepad.com/infosearcher/resources/googlebeyond.html

Berkowitz, B., & Serim, F. (2002). Moving Every Child Ahead: The Big6 Success Strategy. Multimedia Schools, 9(3), 16-20,22.

Chow, A. S., Smith, K., & Sun, K. (2012). Youth as Design Partners: Age-Appropriate Websites for Middle and High School Students. *Journal Of Educational Technology & Society*, *15*(4), 89-103.

Coiro, J. (2003). Exploring literacy on the Internet: Reading comprehension on the Internet: Expanding our understanding of reading comprehension to encompass new literacies. The Reading Teacher. 56(5), 458-464.

Dick, C., Carey, L., & Carey J. (2011). The Systematic Design of Instruction (7th ed). New Jersey: Allyn & Bacon.

Eagleton, M., Guinee, K., & Langlais, K. (2003). Teaching Internet literacy strategies: the hero inquiry project. Voices From The Middle. 10(3), 27-35.

Henry, L. A. (2005). Information search strategies on the Internet: A critical component of new literacies. Webology. 2(1), 1-10.

Springboard SEO (2011). Internet search statistics and SEO: 93% of all internet traffic is generated from search engines. Retrieved February 20, 2012, from http://www.springboardseo.com/internet-search-stats.htmlhttp://www.springboardseo.com/internet-search-stats.html

The National Council of Teacher (NCTE) & International Reading Association (IRA). (2012). *Standards for the English Language Arts*. Retrieved March 22, 2013, from http://www.ncte.org/standards/ncte-ira